UNIT 8 - ENVIRONMENTAL IMPACTS ASSESSMENT

Structure

8.1. INTRODUCTION:

An Environmental Impact Assessment (EIA) is “an assessment of the possible positive or negative impact that a proposed project may have on the environment, considering natural, social and economic aspects”. As per the International Association of Impact Assessment (IAIA), “the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals before major decisions being taken and commitments made”. The consequences of actions that aren't accounted for within the normal market transactions got to be considered clearly within the decision-making processes on projects. These effects are to be identified, assessed, and evaluated against the economic advantages arising out of the given action. The Goal of EIA is to harmonize developmental activities with the environmental concerns. In this context, the EIA studies are considered to be the primary step during this process because they provide a chance to man to think about the consequences of his actions on the environment.

Objectives

After studying this unit, you should be able to

- know about the history and objectives of EIA
- understand types and importance of impacts
- know basic principles and ideal process of EIA
- describe stages of EIA process
- list the benefits of conducting EIA
- overview of Indian scenario of Solid Waste Management (SWM)
- know aspects of SWM and types of EIA
- Understand general flowchart and structure of EIA report

8.2. HISTORY OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

EIAs began to be utilized in the 1960s as a part of a rational decision-making process. It involved a technical evaluation that might cause objective decision making. EIA was made legislation within the US in the National Environmental Policy Act (NEPA) 1969. In India, EIA has been officially initiated in 1994. It's trusted the institutional framework that features a strong supporting governmental, administrative, and procedural set-up. Both central and state governments jointly are sharing the accountability of its progress and management.

The MOEF (Ministry of Environments and forests) is that the agency for environmental clearance. If necessary, it's going to consult a committee of experts with a composition laid out in schedule III of notification. The main laws in India are Water Act (1974); Indian Wildlife Protection Act (1972); Air (Prevention and Control of Pollution) Act (1981); Environment (Protection) Act (1986); The Hazardous Wastes (Management & Handling) Rules, 1989; National Environment Policy (2006). The responsible body for this is often the Central Pollution control board (CPCB).

On 27th January 1994 a notification was issued handling mandatory EIA. The notification requires the project proponent to submit an EIA report, an environment management plan, details of the general public hearing, and a project report back to the impact assessment agency for clearance, further review by a committee of experts in certain cases. By the amendment in the year 1997, a public hearing was made compulsory before impact assessment was finalized. The project proponent is liable for the preparation of the EIA statement, with the assistance of an external consultant or institution. The quantity allocated and spent for preparation of EIA by the project proponents are usually very low compared to the general project costs (often but 1% of overall projects). Environment Impact Assessment may be a very beneficial step to see, whether the project is environment friendly or not. Since economic development is the results of interaction between natural resources and technology supported by designed for people, so all human action should be economic, social, and environment friendly.

Table 8.1: History of EIA

Sr. No.	Time period	Evolution of EIA
1	1960-1970	• Inadequate concern given to environmental issues
2	Early or Mid 1970's	• EIA introduced by NEPA in 1969 in USA • Standard methodologies for impact analysis developed • During 1973-1974 Canada, Australia and New Zealand too adopted EIA • Australia legislated whereas Canada and New Zealand followed administrative procedures
3	Late 1970 & Early 1980's	• France in 1976, Philippines in 1977, Netherlands in 1978 introduced EIA • Use of EIA by developing countries (Brazil, China & Indonesia) • Coordination of EIA with land use planning process • Other Industrial and Developing countries introduced formal EIA requirements
4	Mid 1980's	• European council directive on EIA establishes procedural requirements must for all its member states • Spread of EIA in Asia • World Bank and other leading aid agencies establishes EIA requirements
5	1990's	• Increase use of GIS and other information technologies • India adopted EIA formally • Formulation EA legislation by many developing countries

8.3. OBJECTIVES OF EIA

The objective of the EIA is to forecast the potential environmental harms that might happen due to a projected development and address them within the planning and design stage of the Project. To market development that's sustainable and optimizes resource use also as Management opportunities. The EIA process allows for the communication of possible environmental issues to the project proponent, the regulatory agencies also as all stakeholders and interest groups. After the evaluation of the Environmental Impact assessment, a concept is ready, which is named as Environmental Management Plan (EMP). This plan shows all the outcomes point by point, and in the end, the Evaluation and Plan are combined referred to as EIA-EMP draft.

8.3.1. Environment:

Environment refers to the surroundings in which a project is planned, implemented and operates. Many new activities progress will bring various impacts of the environment linked with its source. This might be roughly categorized as reversible, irreversible, long-term, and short-term impacts. It's necessary to know the links between environment and development so as to create choices for development which will be economically efficient, socially equitable, and responsible, also as environmentally sound. The word 'Environment' includes the following:

1. Soil, water, air, climate, and landscape
2. Human health and safety
3. Use of land, natural resources, and raw materials
4. Flora, fauna, ecosystems, and biodiversity
5. Heritage, recreation, and amenity assets
6. Livelihood, lifestyle, and well being of affected communities
7. Protected areas and sites of special significance

Table 8.2: Environmental components for EIA Analysis

Physical Component	Bio-cultural Component
Land	Nature
Water	People
Air	Cultural
Energy	Access

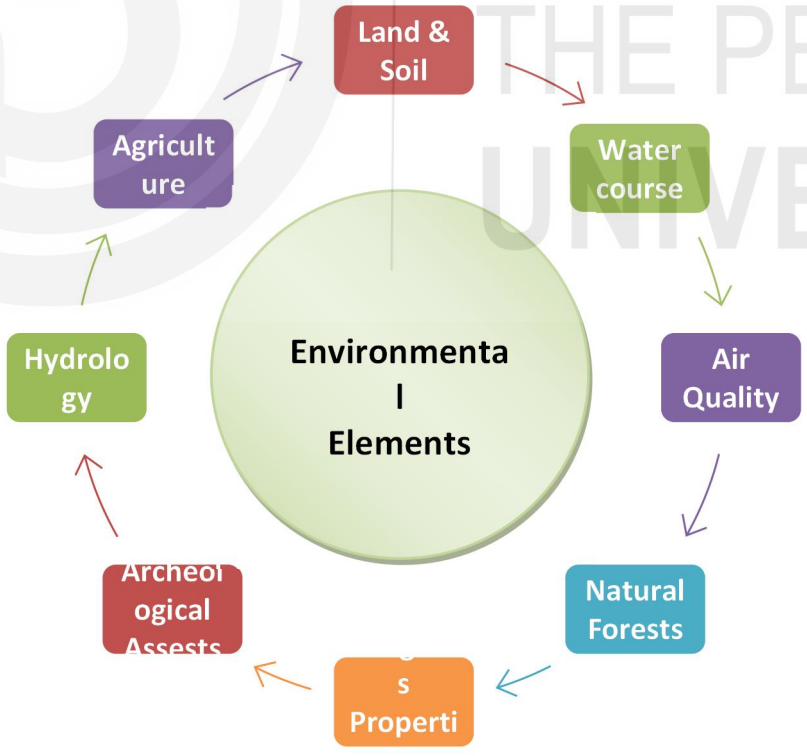

Figure 8.1: Environmental Elements

8.3.2. Environmental Impacts

Environmental impacts resulting from proposed actions can be grouped into the following categories:

- Accidental or planned (recognized beforehand)
- Beneficial or detrimental
- Cumulative or distinct (single)
- Direct (primary) or Indirect (secondary)
- Local, regional, national or global
- Naturally reversible or irreversible
- Occurring during the construction phase or operational phase
- Repairable via management practices or irreparable
- Short term or long term
- Temporary or continuous

The category of impact as stated above and the significance will facilitate the Expert Appraisal Committee (EAC) or State Level EAC (SEAC) for EIA studies, as well as, in the decision-making process about the developmental activity.

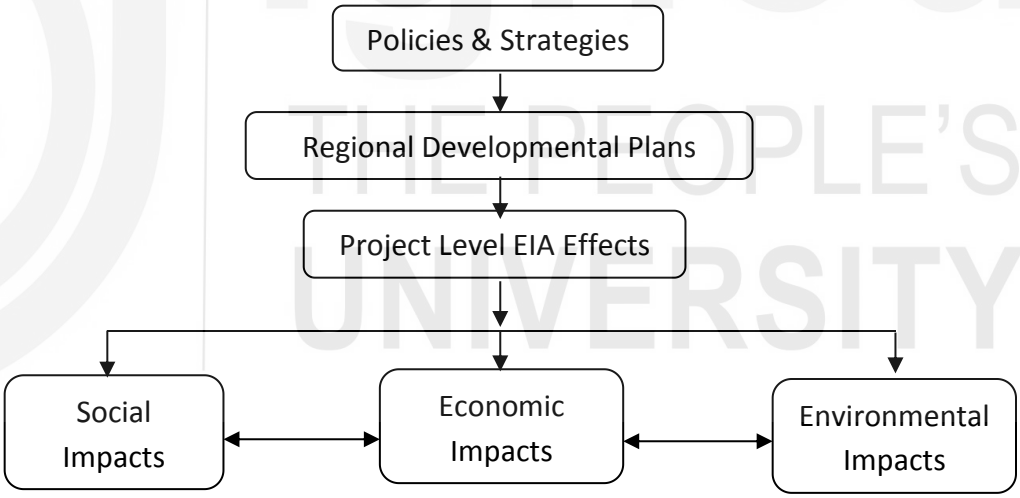

Figure 8.2: Flowchart and Types of Impacts

The nature of impacts could fall within three broad classifications i.e., direct, indirect, and cumulative, supported the characteristics of impacts. The assessment of direct, indirect, and cumulative impacts shouldn't be considered in isolation or considered as separate stages within the EIA. Ideally, the assessment of such impacts should form an integral part of all stages of the EIA. The TGM doesn't recommend one method to assess the kinds of impacts but suggests a practical framework/approach that may be adapted and combined to suit a specific project and the nature of impacts.

(a) Direct Impacts:

Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component. For instance , migration or transport of leachate containing suspended solids and pathogens from the waste disposal site into a close-by water body may cause degradation in water quality in terms of high biological oxygen demand (BOD) or dissolved oxygen (DO) or the increase of water toxins polluting the ground and surface waters. Another example of direct impact would be emissions of methane and CO2 gases which shall aggravate the ambient pollution concentrations.

(b) Indirect Impacts:

Indirect impacts on the environment are those which aren't immediate results of the project, often produced far from or as a result of a complex impact pathway. The indirect impacts are called secondary or maybe third level impacts. As an example, health impacts because of toxic gas emissions, contamination of soils because of leachate that is generated, odors from the solid waste, noise because of constructions at the facility, etc. A number of the impacts are characterized as socio-economic (third level) impacts. The indirect impacts might also include growth-inducing impacts and other effects associated with induced changes to the pattern of land use or additional road network, population density, or rate of growth (e.g. around a disposal site). In the process, air, water, and other natural systems including the ecosystem can also be affected. Indirect impacts might be both positive and negative, for example: on one hand, the proposed project may increase the potential for employment and development of ancillary industry and on the opposite due to the pollution potential and on aesthetic considerations, the land values may diminish within the immediate surroundings of the proposed disposal site.

(c) Cumulative Impacts:

Cumulative impact consists of an effect that's created as a results of the mixture of the project evaluated within the EIA along with other projects causing related impacts. These impacts occur when the incremental impact of the project is combined with the cumulative effects of other past, present, and fairly foreseeable future projects. Figure 2-3 depicts a similar. Respective EAC may exercise their discretion on a case-by-case basis for considering the cumulative impacts.

(d) Induced Impacts:

The cumulative impacts are often because of induced actions of projects and activities which will occur if the action under assessment is implemented like growth-inducing impacts and other effects associated with induced changes to the pattern of future land use or additional road network, population density, or rate of growth (e.g., excess growth could also be induced within the zone of influence around the disposal facility, (particularly poorer sections of the community), and in the process causing additional effects on air, water, and other natural ecosystems). Induced actions might not be officially announced or be a part of any official plan. A rise in the workforce due to the expansion of formal or informal ancillary industry like rag picking, recycling, etc. and nearby communities contributes to the current effect.

Figure 8.3: Solid Waste Dumping Yard

Figure 8.4: Construction Solid Waste

Figure 8.5: Biomedical Waste

Figure 8.6: Municipal Solid Waste

Figure 8.7: Mixed Solid Waste Disposal

Figure 8.8: Electronic Waste (E-Waste) Disposal

8.4. IMPORTANCE OF IMPACTS

The significance reflects the "worst-case scenario" before mitigation is applied, and thus provides an understanding of what may happen if design measures of mitigation fail or aren't as effective as predicted. For establishing the importance of various impacts, understanding the responses and interaction of the environmental

system is important. Hence, the impact of interactions and pathways are to be understood and established first. Such an understanding will help in the assessment process to quantify the impact as accurately as possible. Complex interactions, particularly in the case of certain indirect or cumulative impacts, may produce to nonlinear responses which are often difficult to know , and thus their significance is difficult to assess. It's hence understood that indirect or cumulative impacts are more complex than the direct impacts. Currently, the impact assessments are limited to direct impacts. Just in case mitigation measures are delineated before determining the importance of the effect, the sign represents the residual effects.

8.4.1. Criterion to Workout The Importance of The Identified Impacts

The criteria are often determined by answering some questions regarding the factors affecting the importance. This may help the EIA stake-holders, the practitioner, especially , to work out the importance of the identified impacts eventually. Typical samples of such factors include the following:

- Exceeding threshold Limit: Significance may increase if a threshold is exceeded. e.g., Emissions of particulate matter exceed the permissible threshold.
- Effectiveness of mitigation: Significance may increase as the effectiveness of mitigation measures decreases. e.g., control technologies, which may not assure consistent compliance to the requirements.
- Size of the study area: Significance may increase as the zone of effects increases.
- Incremental contribution of effects from action under review: Significance may increase as the relative contribution of an action increases.
- Relative contribution of the effects of other actions: Significance may decrease as the significance of nearby larger actions increase.
- Relative rarity of species: Significance may increase as species becomes increasingly rare or threatened.
- Significance of local effects: Significance may increase as the significance of local effects is high.
- Magnitude of change relative to natural background variability: Significance may decrease if effects are within natural assimilative capacity or variability.
- Creation of induced actions: Significance may increase as induced activities also highly significant.
- Degree of existing disturbance: Significance may increase if the surrounding environment is pristine.

For determining the importance of impacts, it's important to recollect that secondary and higher-order effects also can occur as a result of the first interaction between project activity and also the local environment. Wherever a primary effect is identified, the practitioner should think if secondary or tertiary effects on other aspects of the environment could also arise.

8.4.2. Testing the importance of Impacts

The following set of conditions could also be used as the checklist for testing the importance of the impacts:

- Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
- Will the effect be unusual within the area or particularly complex?
- Will valuable or scarce features or resources be affected?
- Will new features are out-of-scale with the prevailing environment?
- Will the effect extends over an outsized area?
- Will there be any potential for a trans-frontier impact?
- Will many of us be affected?
- Will there be an outsized change in environmental conditions?
- Will it's difficult to avoid, or reduce or repair or compensate for the effect?
- Is there a risk that protected sites, areas, and features are going to be affected?
- Is there a high probability of the effect occurring?
- Will the effect continues for an extended time?
- Will the effect be permanent instead of temporary?
- If it's intermittent will it's frequent instead of rare?
- Will the impact be irreversible?
- Is there a risk that environmental standards are going to be breached?
- Will the impact be continuous instead of intermittent?

8.4.3. Methods for Identification of Impacts:

There are various factors that influence the approach adopted for the assessment of direct, indirect, cumulative impacts, etc. for a specific project. the tactic should be practical and suitable for the project given the info , time, and financial resources available. However, the tactic adopted should be ready to provide a meaningful conclusion from which it might be possible to develop, where necessary, mitigation measures, and monitoring. Key points to think about when choosing the method(s) include:

- Nature of the impact(s)
- Availability and quality of data
- Availability of resources (time, finance and staff)

The method chosen shouldn't be complex but should aim at presenting the leads to how which will be easily understood by the developer, decision-maker, and therefore the public. There are some advantage and drawbacks of impact identification methods given below:

8.4.4. Advantages of Methods of Identification of Impacts:

- Simple to understand and use
- Good for site selection and priority setting
- Simple ranking and weighting
- Link action to impact
- Good methods for displaying EIA results
- Useful in simplified form for checking for second order impacts
- Handles direct and indirect impacts

- Useful for comparing site and planning alternatives for routing linear developments.

8.4.5. Disadvantages of Methods of Identification of Impacts:

- Difficult not distinguish between direct and indirect impacts
- The process of incorporating values can be controversial
- Significant potential for double counting of impacts
- Sometimes can become very complex if used beyond simplified version
- Do not address impact duration or probability

While identifying the likely impacts, also include the subsequent for analysis of importance and required mitigation measures:

- Impacts due to transportation of waste and transport system
- Impacts due to leachate generation on groundwater, drainage and surroundings
- Impacts due to breeding of domestic flies and their maggots
- Impacts due to methane (CH_4) and carbon-dioxide (CO_2) gas emissions from
- the existing waste
- Impacts on community health effects
- Impacts due to fire hazards in waste dump
- Impacts due to noise

SAQ 1

(a) Write classification of impacts. Explain any two in short.
(b) What is the importance of impacts? Explain criterion to work out the importance of the identified impacts.
(c) Enlist the checklist for testing the importance of the impacts.
(d) Write any 4 advantages and disadvantages of methods of identification of impacts.

8.5. BASIC EIA PRINCIPLES

By integrating the environmental impacts of the event activities and their mitigation early within the project planning cycle, the advantages of EIA might be realized altogether stages of a project, from exploration and planning, through construction, operations, decommissioning, and beyond site closure. A properly-conducted - EIA also lessens conflicts by promoting community participation, informing decision-makers, and also helps in laying the bottom for environmentally sound projects. An EIA should meet a minimum of three core values:

- Integrity: The EIA process should be fair, objective, unbiased and balanced
- Utility: The EIA process should provide balanced, credible information for deciding
- Sustainability: The EIA process should end in environmental safeguards

8.5.1. Ideally an EIA process: should be

- Adaptive - should be adjusted to the realities, issues, and circumstances of the proposals under review without compromising the integrity of the method,

and be iterative, incorporating lessons learned throughout the project life cycle.

- Cost-effective - should impose minimum cost burdens in terms of your time and finance on proponents and participants according to meeting accepted requirements and objectives of EIA.
- Credible - should be carried out with professionalism, rigor, fairness, objectivity, impartiality, and balance, and be subject to independent checks and verification.
- Efficient - should achieve the objectives of EIA within the bounds of obtainable information, time, resources, and methodology.
- Focused - should consider significant environmental effects and key issues; i.e., the matters that require to be taken under consideration in making decisions.
- Integrated - should address the interrelationships of social, economic, and biophysical aspects.
- Inter-disciplinary - should make sure that appropriate techniques and experts within the relevant bio-physical and socio-economic disciplines are employed, including the utilization of cognitive content as relevant.
- Participative - should provide appropriate opportunities to tell and involve the interested and affected public, and their inputs and concerns should be addressed explicitly within the documentation and deciding .
- Practical - should end in providing information and acceptable and implementable solutions for problems faced by proponents.
- Purposive - should inform decision-makers and end in appropriate levels of environmental protection and community well-being.
- Relevant - should provide sufficient, reliable, and usable information for development planning and deciding.
- Rigorous - should apply 'best practicable' science, employing methodologies and techniques appropriate to deal with the issues being investigated.
- Systematic - should end in full consideration of all relevant information on the affected environment, of proposed alternatives and their impacts, and of the measures necessary to watch and investigate residual effects.
- Transparent - should have clear, easily understood requirements for EIA content; ensure public access to information; identify the factors that are to be taken under consideration in deciding, and acknowledge limitations and difficulties.

8.5.2. Key Stages of EIA:

After a project is assigned, an assessment is completed before the start and that assessment is EIA. This assessment includes 4 different stages which are clearly defined in Environmental Impact Assessment. They are:

1) Screening
2) Scoping
3) Public hearing and
4) Appraisal

1) **Screening** – It's the primary stage that determines whether the project requires EIA or one. It's on the idea of investment in order that the tiny project is often kept far from the tangles of an advanced process. But

even small projects can have severe environmental impacts. Moreover, the technology involved is often harmful to the environment.

2) **Scoping** – It means engaging in discussions with the stakeholders, communities, and native people. During this process, the longer term conflicts and issues which can arise are generally tackled. Taking the opinion of the area people is one among the main tasks of this stage still; it's hardly given any severe considerations.

3) **Public Hearing** – Public hearing is analogous to scoping, the general public must be consulted on the proposed development project. But the reality is hardly any advices are considered by the authorities. It's just another procedure to follow, which is usually ignored most of the time.

4) **Appraisal** – This step involves an expert's advice on available data and review by the competent authority like SPCB. In many cases, there's reliable data available, making this stage ineffective? And in some instances, the review authority lacks people's social services.

8.5.3. EIA Stages Carried Out in India:

1. Screening,
2. Scoping and consideration of alternatives,
3. Baseline data collection,
4. Impact prediction,
5. Assessment of alternatives, delineation of mitigation measures and environmental impact statement,
6. Public hearing,
7. Environment Management Plan,
8. Decision making,
9. Monitoring the clearance conditions.

8.6. BENEFITS OF CONDUCTING EIA:

- It leads to best practice prediction and mitigation of adverse effects of projects.
- Can possible rejection or early withdrawal of unsound proposals.
- It facilitates informed deciding by providing clear, well structured dispassionate analysis of the effect and consequences of proposed projects.
- It assists within the selection of alternatives, including the choice of the simplest practicable and most environmentally friendly option.
- It influences both project selection and style by screening out environmentally unsound projects, also as modifying feasible projects.
- Mitigation of negative environmental and social impacts is feasible.
- It guides for formal approval, including the establishment of terms and conditions of project implementation and follow-up.

8.6.1. Some Problems in Indian System

- The lack of timely availability of reliable and authentic environmental data has been a serious bottleneck in achieving the complete benefits of EIA.
- The environment being a multi-disciplinary subject, a mess of agencies is involved within the collection of environmental data.
- Now, to supply reliable data, Environmental Information Centre (EIC) has been found out to function a professionally managed clearinghouse of environmental information which will be employed by MoEF, project proponents, consultants, NGOs, and other stakeholders involved within the process of environmental impact assessment in India.
- EIC stores data in GIS format and makes it available to all or any environmental impact assessment studies and to EIA stakeholders during a cost-effective and timely manner.

SAQ 2

(a) What are the basic principles of EIA? Which are the minimum core values that EIA should meet?
(b) Explain key stages of EIA.
(c) What are the benefits of conducting EIA?

8.7. COMPOSITION OF THE EXPERT COMMITTEES FOR EIA

As per schedule-3 of EIA Notification, 1994, the chairman will be an outstanding and experienced ecologist or environmentalist or technical professional with wide managerial experience in relevant development sector. The representative of Impact Assessment will act as a member secretary. Chairman and members will serve in their individual capacities except those specifically nominated as representative. The membership of the committee shall not exceed. The committee will consist of experts in the following fields:

a. Eco-system management
b. Air/water pollution control
c. Water resource management
d. Flora/fauna conservation and management
e. Land use planning
f. Social sciences/rehabilitation
g. Project appraisal
h. Ecology & Environmental health
i. Subject area specialist
j. Representatives of NGOs/persons concerned with environmental issues

✓ **Checklists**:

It consists of a list of environmental parameters to be investigated for potential impacts. They, therefore, ensure complete coverage of environmental aspects to be investigated.

- Earth: Mineral resources; construction material; soils; land form; force fields and background radiation; unique physical features;

- Water: Surface (rivers, lakes and reservoirs, estuaries); coastal seas and ocean, underground; quality; temperature; recharge; snow, ice, and permafrost;
- Atmosphere: Quality (gases, particles); climate (micro, macro); temperature;
- Flora: Trees; shrubs; grass; crops; microflora; aquatic plants; endangered species; barriers; corridors;
- Fauna: Birds; land animals including reptiles; fish and shellfish; benthic organisms; insects; micro-fauna; endangered species; barriers; corridors;
- Land use: Wilderness and open space; wetlands; forestry; grazing; agriculture; residential; commercial; industrial; mining and quarrying;
- Recreation: Hunting; fishing; boating; swimming; camping and hiking; picnicking; resorts.

8.8. EIA INDIAN SCENARIO

Environmental clearance from the Central Government is required for 32 categories of developmental projects broadly categorized under the following industrial sectors EIA Scenario in India:

1. Mining
2. Thermal power plants
3. River valley
4. Infrastructure (road, highway, ports, harbors and airports)
5. Industries including very small electroplating or foundry units

Certain activities permissible under the Coastal Regulation Zone Act, 1991 also require similar clearance. Donor agencies operating in India like the World Bank and the ADB have a different set of requirements for giving environmental clearance to projects that are funded by them.

8.8.1. Solid Waste Management Indian scenario

The rapid urbanization is changing the nature of solid waste management from a low priority, localized issue to a pervasive social and environmental problem with risks to public health and environment. Municipal Solid Waste (MSW) management is constrained by institutional weakness, lack of proper funding, lack of proper management and operational systems, public apathy, lack of municipal will to become financially self-sufficient through municipal taxation, etc. In Indian towns, MSW storage is at a centralized place. Individuals deposit their waste in bins/enclosures located at street corners at specific intervals. The containers generally are constructed of metal, concrete, or brick masonry. Indiscriminate littering of roads and drains is additionally common in most cities and towns. Community storage may reduce the value of waste collection, but chances of littering remains. Scavenging of the wastes by rag pickers and stray animals causes further scattering of solid waste. it's often perceived by the municipal authorities that the shortage of civic awareness among city residents is proving to be a serious hurdle in maintaining the cleanliness. the matter is most acute in slums and in areas where the lower and middle income groups reside. due to the poor conditions for temporary storage of wastes, in some areas, NGOs are involved in making arrangements for waste collection from households resulting in improvement in street cleanliness. Differing types of vehicles, varying from bullock carts to compactors, are used for transportation of waste.

However, the general-purpose open body trucks of 5 to 9 tones capacity are in common use. In smaller towns, tractor-trailers are used despite being slow. In few cities, compactor vehicles also are getting used. The waste is transported mostly by municipal vehicles; though, in some large towns, private vehicles also are hired to reinforce the fleet size. The upkeep of the vehicles is administered within the general municipal workshop alongside other municipal vehicles where usually the municipal refuse vehicles don't receive the priority. Most of those workshops have facilities for minor repairs only. Although preventive maintenance is important to take care of collection fleet in proper operating condition, this aspect is usually neglected. Transfer stations are available only in few metropolitan cities. Several thousands of urban dwellers in India make their living upon waste processing by working in small industries, which recycle plastics, tin cans, bottles, bones, hair, leather, glass, metal etc., recovered from MSW. Most of the fabric containing metals, unsoiled paper, plastics, glass, cardboard, etc. are marketable and hence recycled by householders themselves or by the rag-pickers.

By the time waste reaches the community bins, it contains only a little portion of recyclable material and consists mainly of vegetable/fruit peelings, scraps of soiled paper and plastic, used toiletries, and inert material like sand and stones, etc. The larger proportion of organic matter in MSW indicates the desirability of biological processing of waste like composting. Though composting has been the prevalent biological processing practiced in India, there are problems thanks to transportation, poor acceptance by farmers (may be due to quality concerns), marketing, price etc. Recently efforts are being taken to popularize waste segregation and composting. Characteristics of the Indian MSW bring out the very fact that a self-sustaining combustion reaction can't be obtained with a majority of Indian MSW and auxiliary fuel are going to be required to assist waste combustion.

In majority of urban centers, waste is being disposed of in low-lying areas. The disposal sites are selected on the idea of their proximity to the gathering areas and new disposal sites are normally identified only the prevailing ones are filled. In most cases, the waste is just dumped at such sites and, except within the major cities, bulldozers are rarely used for compaction at the disposal site. Even in these cities, they're used mainly for leveling of the deposited waste. Proper weighing, filling and soil layering aren't practiced in many areas. Provisions for leachate and gas control don't exist at many places. A soil cover is never provided, except at the time of ultimate closure of the location. Most of the disposal sites are unfenced and therefore the waste picking is usually hip, posing problems within the operation of the sites. it's a standard practice to light a fireplace on the dumpsite by the rag-pickers either to scale back the menacing flies and volume or odour and facilitate waste picking.

In sight of the problem in acquiring land for establishing waste management and disposal facilities, it's imperative that the prevailing dumpsites are redesigned to receive present and future wastes. As haphazard dumping across the dumpsites has been a standard practice, and contamination of the encompassing areas isn't uncommon, those dumpsites got to be rehabilitated and redesigned to recover space for future wastes. The rehabilitation measures should include measures to contain the contaminant migration and where possible

lining the bottom of the fill and style it to receive future wastes for a period of 20 years of more through innovative designs and strategically operations and maintenance.

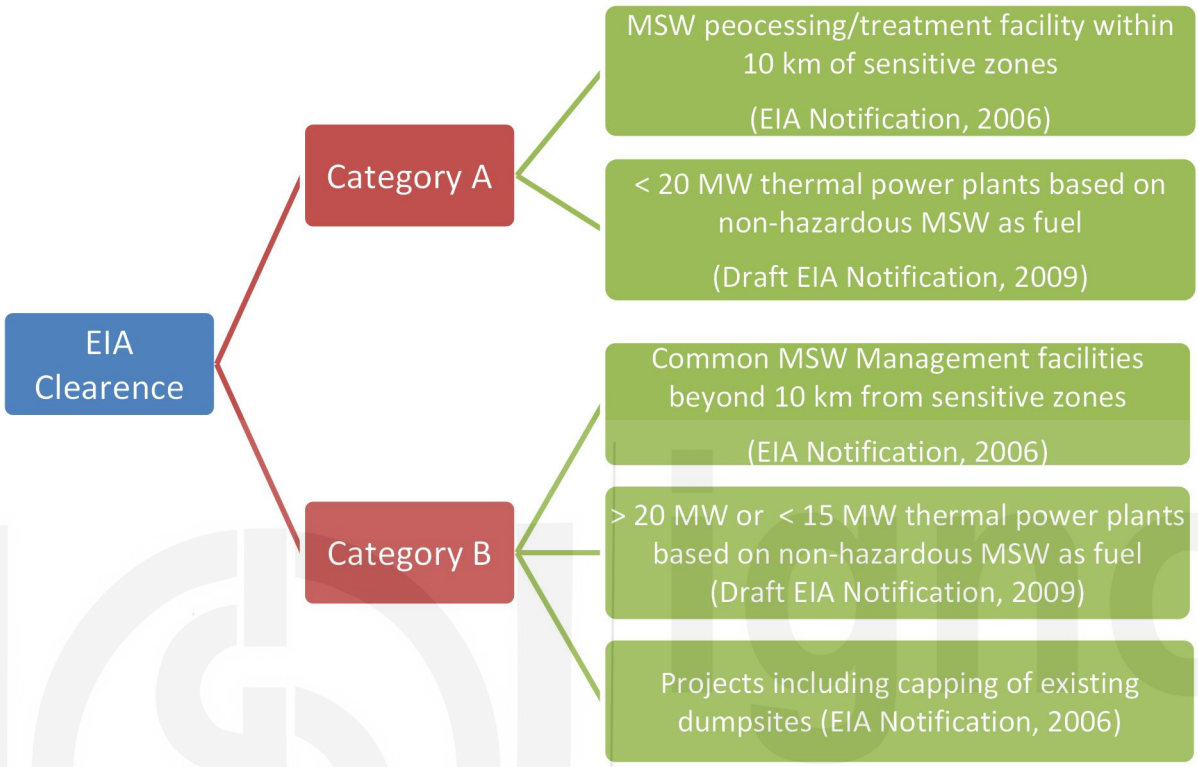

Figure 8.9: Environmental Impact Assessment Clearance Requirements for Municipal Solid Waste Management (MSW) Projects

8.8.2. Various Aspects of Solid Waste Management and indicators

There are several aspects of solid waste management: technical, financial, institutional and social. Each of these aspects has certain issues, which need to be deliberated upon to achieve sustainable and effective waste management. The implementation and progress can be monitored by evolving certain indicators, which are discussed below:

A. Technical Aspects

- Inadequate technical expertise and planning capability in most of the Urban Local Bodies (ULBs)
- Technical expertise available with a number of of the metro and mega cities is not fully utilized and not given due weightage in decision making
- Inadequate solid waste management plans in the system at local and national levels
- Low priority for research and development in solid waste management sector
- Selection of appropriate technology for handling and disposal of solid waste is frequently left open in the tenders

- Considerable work is required to be done on recycling, parameters of health and safety of recycled products, etc.
- Competitive market not yet developed for procurement of plant and equipment for processing MSW and other solid waste materials

Indicators

- Quality and extent (coverage) of service provided
- Impact on health and environment

B. Financial Aspects

- ULBs are unable to generate adequate funds from their own sources, such as municipal taxes (as mandated by the 74th Constitutional Amendment Act)
- Good financial management and planning for the available resources by the local government
- Additional support from users through user charges as supplement to property tax

C. Institutional Aspects

- Coordination of solid waste management projects and activities by dedicated department or cell in each ULB
- Inadequate coordination between the relevant agencies
- Enforcement of applicable Rules and regulations by the ULB
- Provision of clear mandates and sufficient resources to fulfill the mandates by the ULBs
- Only environment friendly sustainable options to be implemented by local government
- Nodal department in the State Government (Municipal Administration / Urban Development) should provide guidance and oversee implementation of applicable Rules

Indicators

- Self-sufficiency within the ULBs for tackling MSW management

D. Social Aspects

- Lack of public awareness and school education programmes
- Lack of genuine interest amongst the public and other stakeholders
- Low paid employment for waste workers
- Waste workers have very low social status

Indicators

- Public cooperation
- Social equity for the waste workers

8.8.3. Sustainable development:

Sustainable development is development that meets the requirements of this without compromising the power of future generations to satisfy their own needs. It's built on three basic premises i.e., economic process, ecological (and environmental) balance and social progress. Economic process achieved during a way that doesn't consider the environmental concerns, won't be sustainable within the end of the day. Therefore, sustainable development needs careful integration of environmental, economic, and social needs so as to

realize both an increased standard of living briefly term, and a net gain or equilibrium among human, natural, and economic resources to support future generations within the future. It's necessary to know the links between environment and development so as to form choices for development which will be economically efficient, socially equitable and responsible, also as environmentally sound.

Figure 8.10: Sustainable development Elements

8.8.4. Types of EIA:

Environmental assessments might be classified into four types i.e. strategic environmental assessment (SEA), regional EIA, sectoral EIA and project level EIA. These are precisely discussed below:

i. Strategic Environmental Assessment (SEA):

SEA refers to systematic analysis of the environmental effects of development policies, plans, programmes and other proposed strategic actions. SEA represents a proactive approach to integrate environmental considerations into the upper levels of decision making – beyond the project level, when major alternatives are still open.

ii. Regional EIA:

EIA within the context of regional planning integrates environmental concerns into development planning for a geographic region, normally at the sub-country level. Such an approach is referred to as the economic-cum-environmental (EcE) development planning. This approach facilitates adequate integration of economic development with management of renewable natural resources within the carrying capacity limitation to achieve sustainable development. It fulfills the need for macro-level environmental integration, which the project-oriented EIA is unable to address effectively. Regional EIA addresses the environmental impacts of regional development plans and thus, the context for project-level EIA of the subsequent projects, within the region. In addition, if environmental effects

are considered at regional level, then cumulative environmental effects of all the projects within the region can be accounted.

iii. Sectoral EIA:

Instead of project-level-EIA, an EIA should take place in the context of regional and sectoral level planning. Once sectoral level development plans have the integrated sectoral environmental concerns addressed, the scope of project-level EIA will be quite minimal. Sectoral EIA helps in addressing specific environmental problems that may be encountered in planning and implementing sectoral development projects.

iv. Project level EIA:

Project level EIA refers to the developmental activity in isolation and therefore the impacts that it exerts on the receiving environment. Thus, it's going to not effectively integrate the cumulative effects of the event during a region. From the above discussion, it's clear that EIA shall be integrated in the least the amount i.e. strategic, regional, sectoral and therefore the project level. Whereas, the strategic EIA may be a structural change within the way the items are evaluated for decision-making, the regional EIA refers to substantial information science and drawing complex inferences. The project-level EIA is comparatively simple and reaches to meaningful conclusions. Therefore in India, project-level EIA studies happen on an outsized scale and are being considered. However, within the re-engineered Notification, provisions are incorporated for giving one clearance for the whole industrial estate for e.g., Leather parks, pharma cities etc., which may be a step towards the regional approach. As we progress and therefore the resource planning concepts emerge in our decision-making process, the mixing of overall regional issues will become a part of the impact assessment studies. Thus the ocean , Regional EIA, and Sectoral EIA evaluate environmental, social and ecological effects on a bigger scale and should be considered as tools for the event of framework of designing at country, sub-country and regional levels, while the project level EIA focuses on developmental activity of a proposed project during a given location. In identifying the project (site also because the proposed activities), due consideration to the urban land use planning issues should tend.

8.9. GENERAL FLOWCHART AND STRUCTURE OF EIA STUDY

The professional Team identified for a selected EIA study should contains qualified and experienced professionals from various disciplines so as to deal with the critical aspects identified for the precise project. supported the character and therefore the environmental setting, professionals could also be identified for EIA studies are like Environmental management specialist, Air and noise quality, Geology/geo-hydrology, Ecologist, Chemical engineer, Transportation Specialist, Health specialist, Scientist, etc.

A better EIA practice requires technical understanding of relevant issues and therefore the measures that employment in such given circumstances: The priority of selection of mitigation measures should be within the order:

2. **First Step-Impact avoidance:** This step is best when applied at an early stage of project planning. It are often achieved by not undertaking certain projects or elements that would end in adverse impacts, avoiding areas that are environmentally sensitive and fixing place the preventative measures to prevent adverse impacts from occurring, for instance , release of water from a reservoir to take care of a fisheries regime.
3. **Second Step-Impact minimization:** This step is typically taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It are often achieved by cutting down or relocating the proposal, redesigning elements of the project, and taking supplementary measures to manage the impacts.
4. **Third Step-Impact compensation:**
   This step is typically applied to remedy unavoidable residual adverse impacts. It are often achieved by rehabilitation of the affected site or environment, for instance , by habitat enhancement and restocking fish, restoration of the affected site or environment to its previous state or better, as typically required for mine sites, forestry roads and seismic lines and replacement of an equivalent resource values at another location. for instance , by wetland engineering to supply the same area thereto lost to drainage or infill.

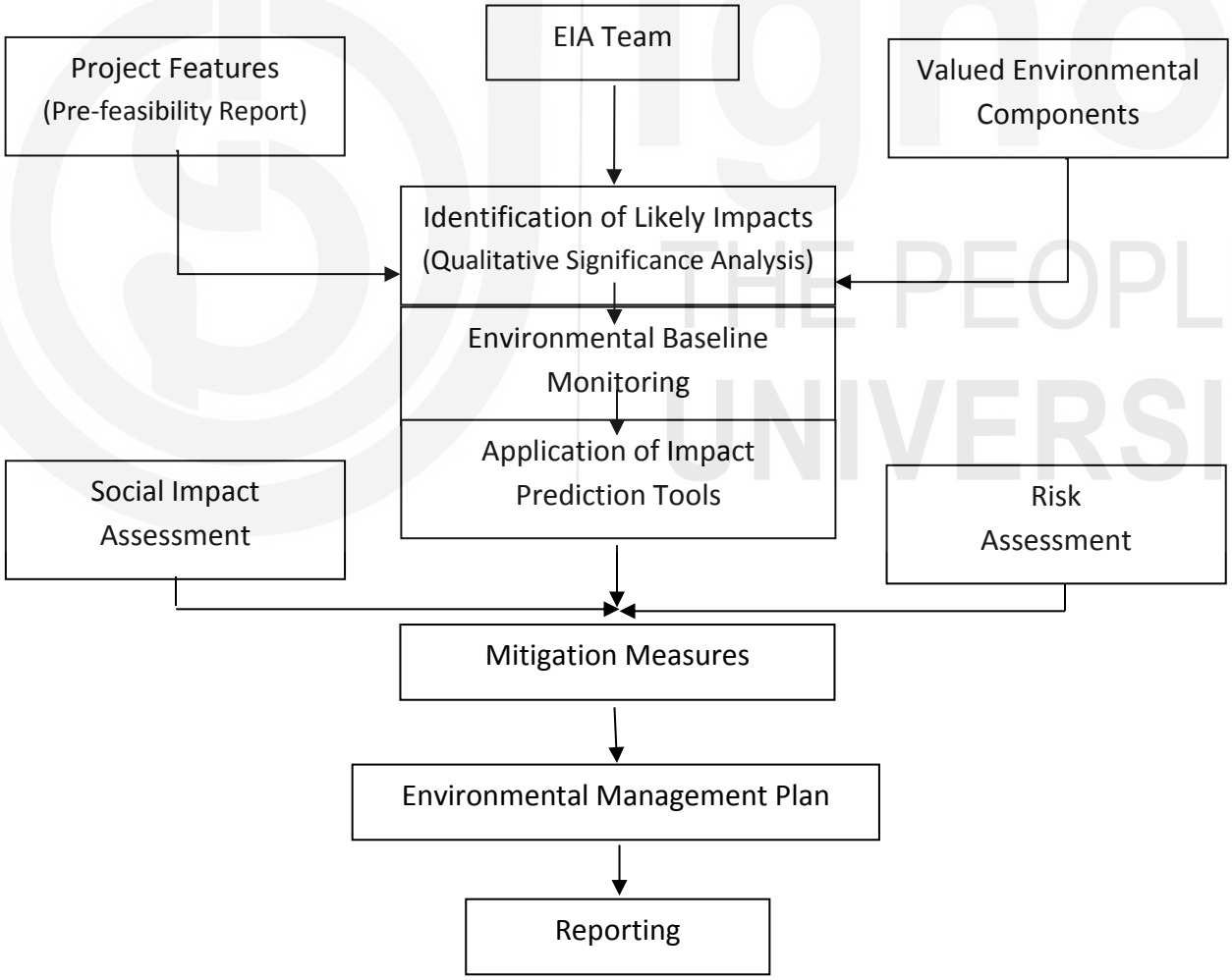

Figure 8.11: Flowchart of EIA Study

Table 8.3: Structure of Environmental Impact Assessment (EIA) Report

Sr. No.	EIA Structure	Content
1	Introduction	Purpose of the Report
		Identification of project and project proponent
		Brief description of project & its importance
		Scope of study-Detailed
2	Project Description	Type of project
		Need of project
		Location, layout of project
		Size and activities of project
		Proposed schedule for approval and implementation
		Technology & process description
		Description of mitigation measures incorporated into the project to meet environmental standards or EIA requirements
3	Description of the Environment	Study area, period, components & methodology
		Establishment of baseline as identified in the scope
		Base maps of all environmental components
4	Anticipated Environmental Impacts & Mitigation measures	Details of investigated Environmental impacts due to project location, possible accidents, project design, project construction, operations of completed project
		Measures for minimizing and/or offsetting adverse impacts indentified
		Assessment of significance of impacts
		Mitigation measures
5	Analysis of Alternatives (Technology & Site)	Incase, the scoping exercise results in need for alternatives: Description of each alternative
		Summary of adverse impacts of each alternative
		Mitigation measures proposed for each alternative and selection of alternative
6	Environmental Monitoring Program	Technical aspects of monitoring the effectiveness of mitigation measures (incl. measurement methodologies, frequency, location, data analysis, reporting schedules,
7	Additional Studies	Public consultation
		Risk assessment
		Social impact assessment
8	Project Benefits	Improvements in social and physical infrastructure
		Employment potential –skilled; semi-skilled and unskilled
		Other tangible benefits
9	Environmental Cost Benefit Analysis	If recommended at the scoping stage
10	Environmental Management Plan (EMP)	Description of the administrative aspects that ensures proper implementation of mitigative measures and their effectiveness monitored, after approval of the EIA
11	Summary & Conclusion (This will constitute the	Overall justification for implementation of the project
		Explanation of how, adverse effects have been mitigated

	summary of the EIA Report)	
12	Disclosure of Consultants engaged	Names of the Consultants engaged with their brief resume and nature of Consultancy rendered

SAQ 3

(a) Enlist various fields of experts included in the committee of EIA as per EIA notification 1994.
(b) Write a note on: Solid Waste Management Indian scenario.
(c) What are the various aspects of Solid Waste Management (write 3 points each). Also mention one indicator of each aspect.
(d) What are the types of EIA?
(e) Draw the flowchart of EIA study.

8.10 SUMMARY

This unit covered history of EIA, objectives of EIA and different kinds of environmental impacts due to a project proposal. Also, it covered importance of impacts, criterion to work out the importance of the identified Impacts. This unit gives methods for identification of impacts as well as its advantages and disadvantages.

In this unit basic principles and key stages carried out in India are described. Here Solid Waste Management Indian scenario and various aspects of it are described briefly. In this unit, types of EIA, flowchart of EIA study and structure of EIA report with the roles of stakeholders is given.

8.11 ANSWERS TO SAQs

SAQ 1

(a) Refer section 8.3.2.
(b) Refer section 8.4 and sub-section 8.4.1.
(c) Refer section 8.4.2.
(d) Refer sub-sections 8.4.4 and 8.4.5.

SAQ 2

(a) Refer section 8.5.
(b) Refer sub-section 8.5.2.
(c) Refer section 8.6.

SAQ 3

(a) Refer section 8.7.
(b) Refer sub-section 8.8.1.
(c) Refer sub-section 8.8.2.
(d) Refer sub-section 8.8.4.
(e) Refer figure 8.11.